CO2Meter.com
CO2 Measurement Specialists

User's Manual

CO2 Gas Analyzer

Models Covered

CM-1001
CM-1002
CM-1003

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Save meter information for future reference!

Model Number: _____

Serial Number: _____

Purchase Date: _____

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Welcome!

Thank you for purchasing our meter. This portable meter allows you to measure carbon dioxide in inaccessible areas with a built-in battery-operated micro pump.

Inside the meter is a battery-operated micro-pump connected to two tubing ports on the side of the meter. When the meter is turned ON, the pump draws gas from one tube port and expels it from the other. By connecting tubing to the inlet, you can remotely sample gas. By connecting tubing to both ports, you can create a closed-loop system and return the gas back to the original container. This makes the meter perfect for measuring potentially dangerous high concentrations of CO2 in biological applications.

The meter comes in several models, each with different CO2 levels: 1%, 30% and 100% CO2. All models include a data cable for optional tethered data. The 3.2" touch screen display gives easy access to programming, colors, calibration, logging mode, outputs, etc.

Please take some time to read through this manual in order to become familiar with your meter. Make sure to visit our website regularly to find more information about this product. Please also pay special attention to the important safeguards shown on the pages ahead.

Important Safeguards

To reduce the risk of fire, electrical shock and/or injury to persons, basic safety precautions should always be followed when using electrical appliances, including the following:

1. READ ALL INSTRUCTIONS BEFORE USING THIS METER!
2. Charge rechargeable meters for at least 8 hours before use.
3. The rechargeable meter contains a lithium polymer (Li-Ion) battery. Do not expose the meter to extreme heat or cold.
4. The Li-Ion battery is not user-replaceable. Please don't attempt to open the meter and replace the battery.
5. Use only the included power supply to operate the meter.
6. Make sure that the tubes are securely attached to the device when sampling in a closed environment.
7. Do not operate with an obstructed sample path.
8. Do not allow the meter to be exposed to water.
9. Do not operate the device with the enclosure opened.
10. Do not operate the meter if it is malfunctioning.

SAVE THESE INSTRUCTIONS!

Meter Specifications

Measuring Principle:	Non-dispersive infrared (NDIR) sensor
Measuring Range:	
1% CO2	0-10,000 ppm
30%, 100% CO2	0-30% or 100% vol.
Repeatability:	
0-1% CO2	±20 ppm, ±1% measured value
0-30%, 0-100% CO2	±0.1%, ±2% of measured value
Accuracy:	±30ppm, ±5% measured value
Air Quality Aspect Measured:	CO2 concentration
Power Supply:	
Maximum Voltage	9VDC
Minimum Voltage	6VDC
Power Consumption:	
Operation	~0.5 W avg. (pump running)
Charging	~15 W
Sensor Ratings:	
Life Expectancy	>15 years
Maintenance Interval	No maintenance required
Warm-up Time	<1 min (instant measurements)
Pump Characteristics:	
Maximum Flow (STP)	0.40 LPM
Maximum Vacuum	150 mbar
Maximum Pressure	500 mbar
Maximum System Pressure	~1 atm
Life Expectancy	1,000 to 10,000 hours, depending on sampling interval
Physical Dimensions:	
W x H x D	3.85 x 8.25 x 1.65 inches

Package Contents

Please verify that your package contains the following items before using the meter:

1. (1) User manual
2. (1) Meter
3. (1) Rubber Boot
4. (1) 6-foot USB Cable
5. (1) Li-Ion Battery
6. (1) 8-pin Quick Connector
7. (1) RS-485 Jack Connector
8. (1) 6VDC International Power supply
9. (1) 10-foot length 1/8" tubing
10. (2) 1/8" Barb tubing bulkhead fitting
11. (2) 1/8" Barb 10-32 fittings
12. (2) Particle Filter (CM-0118)
13. (2) Hydrophobic Filter (CM-0117)
14. (2) Moisture Trap (CM-0112)
15. (1) 2GB Micro SD Card with Adapter

Optional Accessories

- Nafion Tubing for Gas Sampling sensor (TUB-0003)
- Extreme Replacement filter (CM-0103-F)
- Hypodermic Needle Kit (CM-0175)

Note: Please contact our technical support staff for more details about these accessories.

Instrument Overview

Below, ***Figure 1 and Figure 2*** provide a view of the components on the top and bottom of the meter, respectively, as referenced throughout the manual.

Figure 1: Top view.

= ON/OFF

= USB Port

In = Inlet for the Gas

Micro SD = Flash Drive

Out= Outlet for the Gas

RS-485 = Modbus

= Power Supply (VDC)

= Outputs

Figure 2: Bottom view.

Power Switch
Press once for ON, press & hold for 5 seconds for OFF

Barb Fittings
Connect to sampling system for closed loop sampling

Display
Full color touch screen shows CO2 levels and other information

Non Removable Protective Boot
Protects meter from impact

Gently slide top edge of boot upwards to uncover top screw of battery compartment to access batteries.

Battery Compartment
Rechargeable battery

Battery Compartment Screw
Two (2) Phillips head screws, other one covered by boot above

Product Label
Includes name, type, model and serial number of meter

Power Source

The meter is powered by Li-Ion Rechargeable 3.7v 60000 mhA battery but can also be powered by the included 6VDC International wall power supply.

Accessories Included

As shown in ***Figure 3***. This jack provides an integrated RS485 converter and terminates to wire ends. Only three conductors D1, D0 and Common are used. This cables allows a host PC (with suitable software) to communicate with multiple RS485 devices on the cable.

FTDI-USB to Modbus RJ45 Wiring			
RJ45 PIN	FTDI USB Color	Cat-5 Color	Terminal
4	Yellow	Blue	RS485 A
5	Orange	White/Blue	RS485 B
8	Black	Brown	GND

Table 1- RS-485 wiring

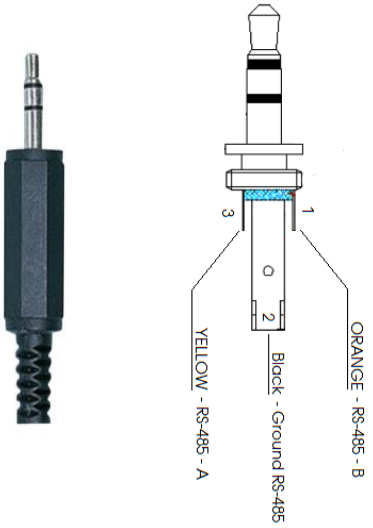


Figure 3: One RS-485 jack connector (Modbus protocol communications)

As shown in ***Figure 4***. This quick connector allow you to use the Relay 2 option on the unit to control a fan, solenoid valve or any device that work with 30 VDC and 1 A. Also provide the connections fo futures accessories.

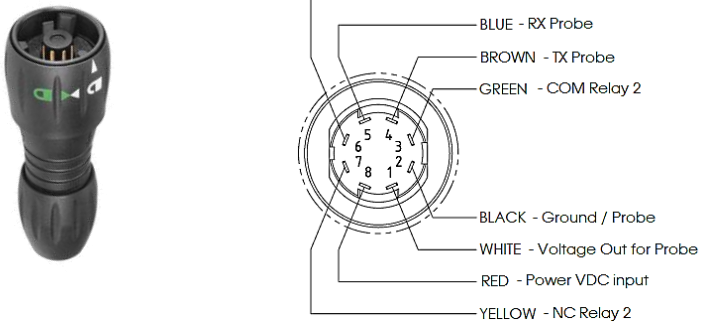

ORANGE - NO Relay 2
BLUE - RX Probe
BROWN - TX Probe
GREEN - COM Relay 2
5 4 3 6 2 7 1 8
BLACK - Ground / Probe
WHITE - Voltage Out for Probe
RED - Power VDC input
YELLOW - NC Relay 2

Figure 4: One 8-pin quick connector

As shown in ***Figure 5***. This Micro SD card is used to storage all the Logging data that you program the unit to collect. It will stamp date an time and CO2 in a CSV. file. You can removed the card from the unit and download the data on a computer using the adapter that is included.

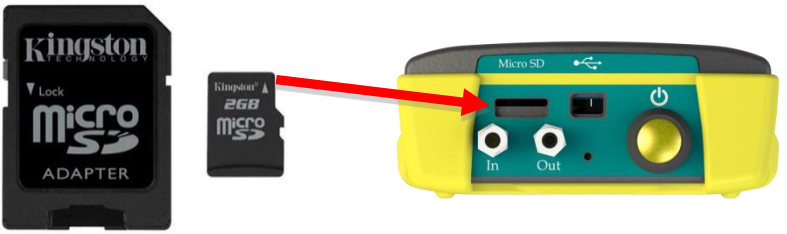


Figure 5: One 2-GB MicroSD card with adapter

Operation Guide

Make sure you read through these instructions thoroughly before using your meter. This guide will help you become more familiar with your meter in order to be as productive as possible in a short period of time. Please read the *Important Safeguards on* page 5 before continuing.

POWERING METER ON

The meter can be powered by the following included accessories:

1. The 6VDC international wall power supply
2. The internal Li-Ion batteries
3. The USB cable when tethered to a computer

Press the ***POWER Switch*** as shown in ***Figure 6*** once to turn the meter ON. Press and hold the **POWER** switch for 5 seconds to power the meter OFF.

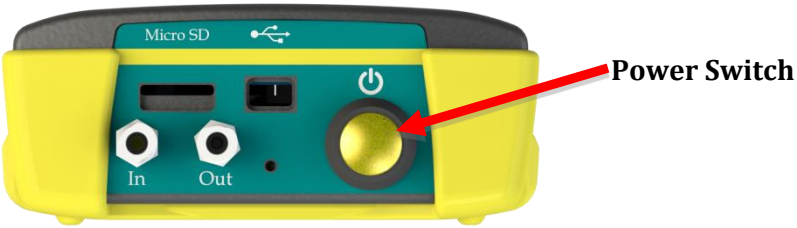


Figure 6: Power switch.

CHARGING THE METER

This meter comes with a rechargeable Li-Ion battery that will charge when the meter is connected to either the USB cable or the included 6VDC power supply.

- The meter will charge faster when using the included 6VDC power supply.
- Charge the battery at least 8 hours before every use.
- The Li-Ion battery has a life expectancy of 8 hours, depending on data logging interval setting and whether both the pump and display are being utilized.

LCD DISPLAY

The Liquid Crystal Display (LCD) touch screen shows the following information:

- Gas concentration level in parts-per-million (ppm) or in percentage format (##.##%) for all the models
- Logging ON/OFF
- Pump ON/OFF
- Battery usage in % / charging mode
- Temperature (##. # C/F) / Humidity (##. #%) – optional

Touchscreen Functions

Use your finger or stylus pen to operate the resistive touchscreen display as shown in

Figure 7.

NOTE: Do not use sharp objects to operate screen.

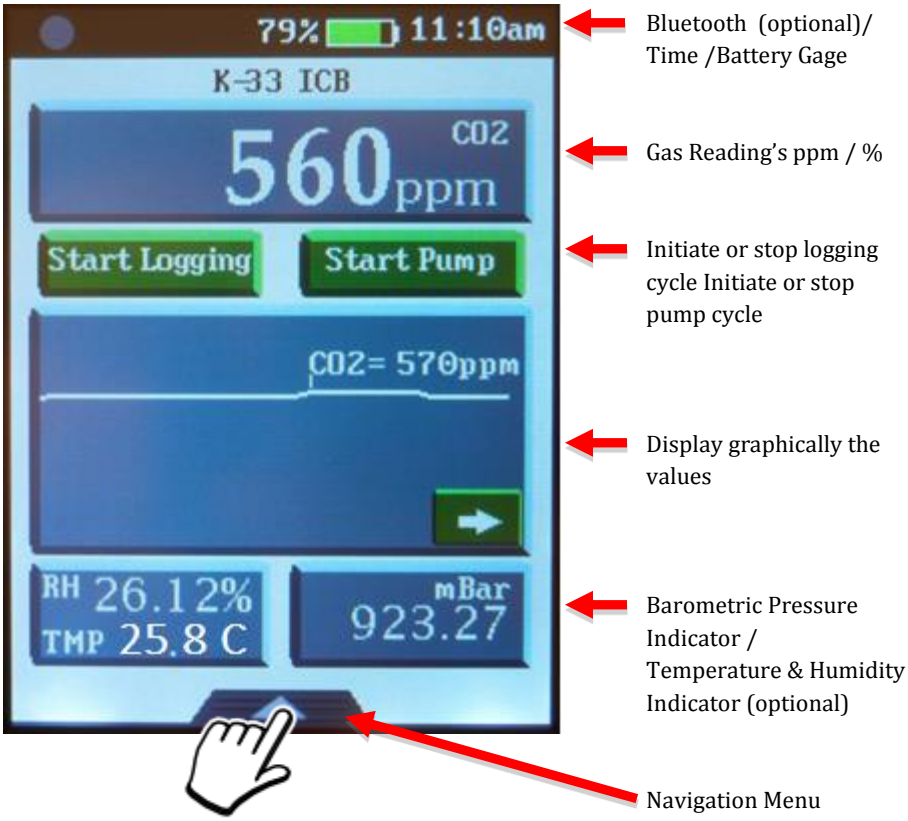


Figure 7: Screen functions.

MENU ARCHITECTURE

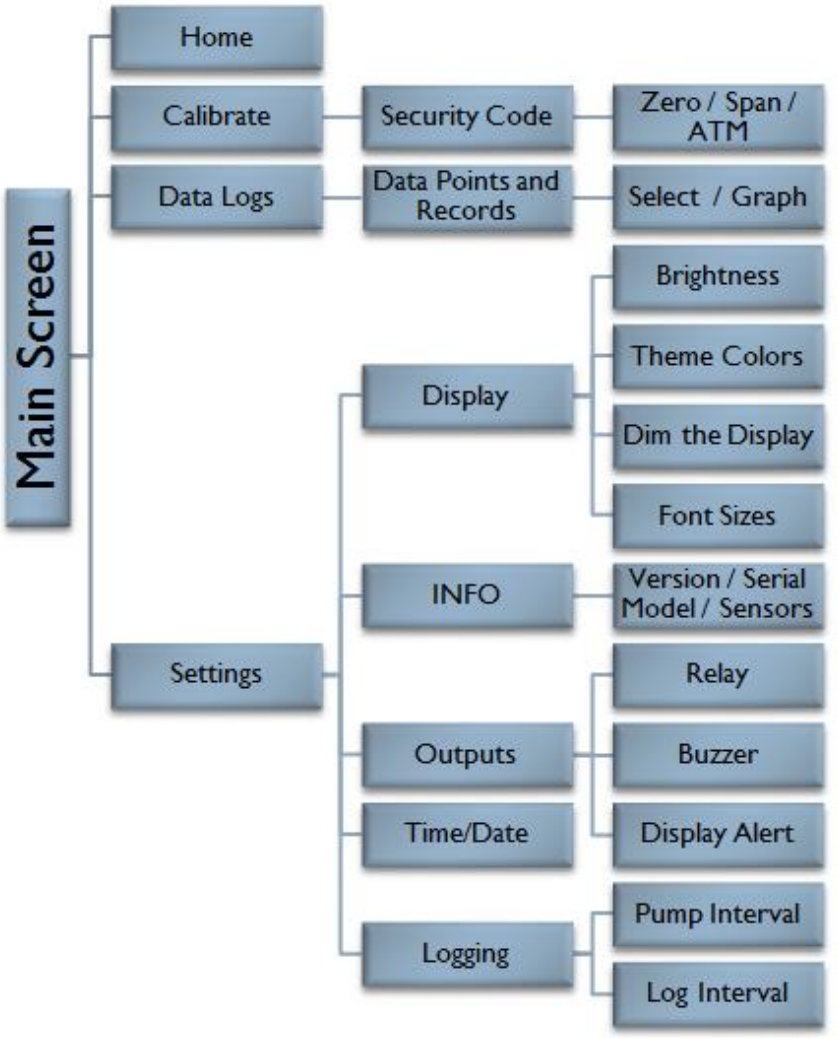


Figure 8: Menu architecture/structure.

NAVIGATION MENU

The navigation menu appears when you press the triangular symbol as shown in

Figure 7. You can fully interact and configure this meter using your fingertips (with or without gloves) or a stylus.

HOME

Access to the main screen providing:

- CO2 values
- RH (Relative Humidity) and Temperature values (based on model)
- Ability to:
  - START LOGGING
  - START PUMP

Figure 9: HOME (main) screen.

CALIBRATE

In order to access the CALIBRATION screen shown in Figure ***10***, a passcode is required. When prompted, enter passcode "1234" on the key pad. The calibration screen allows you to access various calibration options and the sensor information tab.

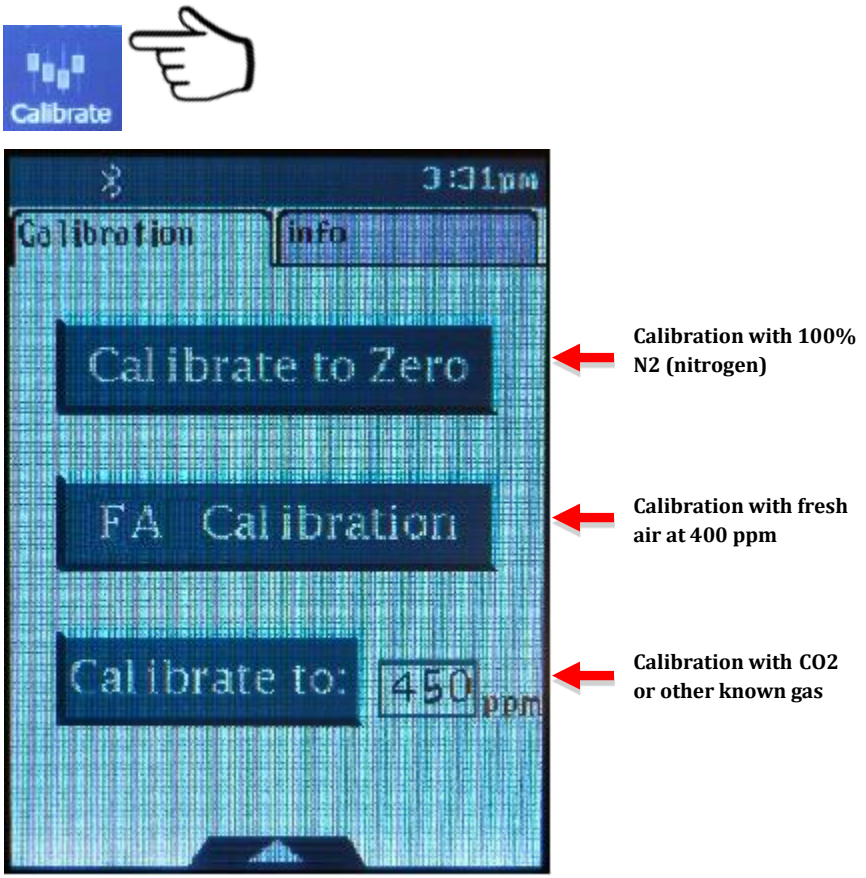


Figure 10: CALIBRATE screen.

Calibration

The calibration process varies depending on the type of meter. All meters are factory-calibrated with multiple reference points of gas, and have been verified to be accurate within their specific functionality before shipment. However, if the meter is severely jolted or otherwise mechanically disturbed, the sensor can drift requiring recalibration.

Procedure

To calibrate the meter, follow these steps:

1. Turn ON the meter and wait the warm up period (1-3 min)
2. On the Main Screen turn ON the Pump.
3. Expose the meter to ambient air (assumed to be at ~400ppm) or connect it to a calibration gas bottle/cylinder (100% nitrogen or Argon) with the appropriate demand regulator or flow regulator.
4. Wait 25 seconds to collect a sample. Write down this value as the "before" value.
5. Click the "Calibrate" button after selecting your calibration gas.
6. Wait 25 seconds again. The meter will take a sample and use this data to adjust zero values. The displayed measurement will show the new calibration value (0 or 400ppm, depending on the method used).
7. Disconnect the calibration gas and wait 25 seconds. All displayed data will now be based on the new calibration value.
8. Repeat this procedure if the sensor is still operating outside of its specified range or if readings vary greatly (typically indicates that the calibration process was unsuccessful).

0-1% or 0-30% Sample Draw Meter

Calibration can be performed using either the "Calibrate to Zero" or the "FA Calibration" option, if using 0% CO2 calibration gas (typically nitrogen, Argon, etc.) or a fresh source of air (assumed to be ~400ppm), respectively.

0-100% Sampling Meter with or without Data Logging

The 0-100% meters do not include the "FA Calibration" option due to the CO2 range they measure. To ensure the highest accuracy, we recommend calibrating these meters with calibration gas 100% Nitrogen for ZERO and a knowing calibrate CO2 gas, close to the concentration being measured. Alternatively, a 0% CO2 or ambient calibration can be performed.

To perform a calibration, power your meter using the wall adapter and either expose it to ambient air or feed it with your calibration gas.

Info

The *Info* tab allows you to change the MODBUS address of the unit to get RS-485 communication. Also is where the meter information is located. Meter ID, Sensor Model and Sensor ID.

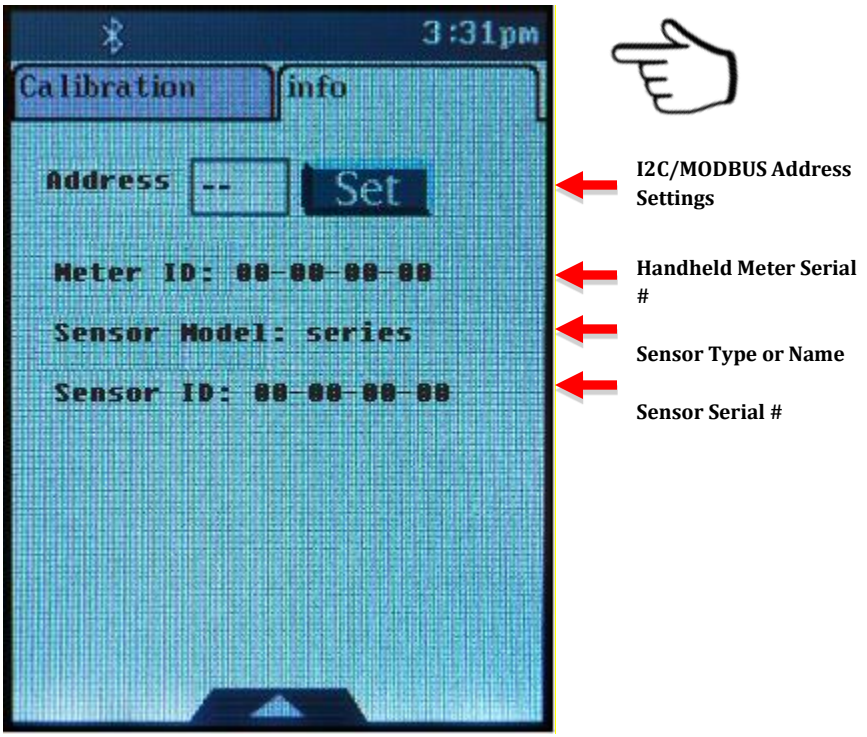


Figure 11: Address for the MODBUS

DATA LOGS

Access logs, display data graphically and view the data storage of the meter.

Figure 12: DATA LOGS screen.

Data Storage

All models feature a 2GB memory micro SD card capable of storing data. This will allow you to simultaneously read and store data of CO2 concentration levels. Charge the meter 8 hours before any operation. The logging period and real-time clock will need to be set under the "Settings" menu as shown in ***Figure 13***.

The micro SD card has the capacity to store up to 12 million data points. This micro SD card can be replaced with a compatible card with larger capacity if desired. The supplied micro SD card comes with its adapter to ensure compatibility with your computer and facilitate the download process.

SETTINGS

Allows access to parameters, options, outputs, communications, and date/time settings for changes or reprogramming.

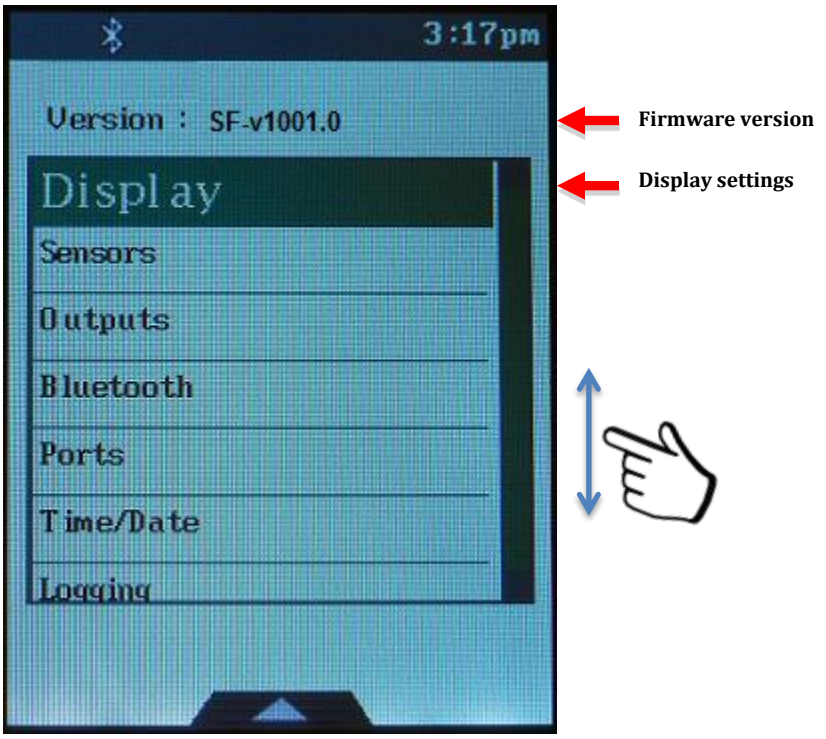


Figure 13: SETTINGS screen. Scroll and select as needed from the list.

DISPLAY Settings

From this screen, the brightness level and color theme (3 available) can be changed on the meter. In addition, a Screen Timeout can be activated to save power. *NOTE:* This setting will not affect the meter's functionality but is important to indicate that it will affect the battery life depending on how the parameter is set.

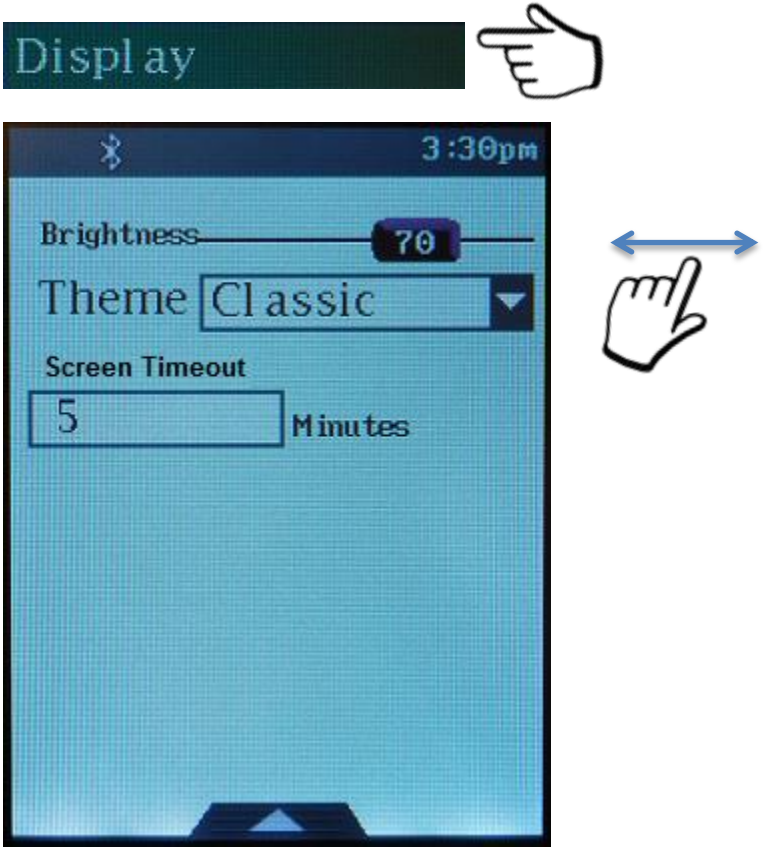


Figure 14: Display settings screen. Scroll horizontally to set brightness.

OUTPUTS Settings

Change the parameters on the relays and other alerts.

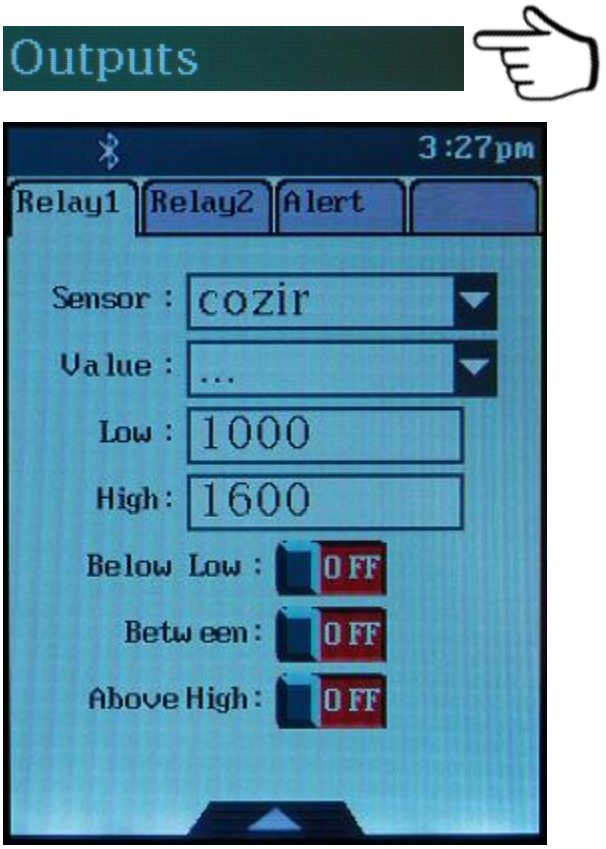


Figure 15: Output settings screen – RELAY1 tab.

RELAY 1 controls an audible alarm built into the meter, it can be programmed to be activated by the CO2 readings, Temperature and Relative Humidity as well as other sensors attached to the meter.

NOTE*:* Temp/RH probe is optional.

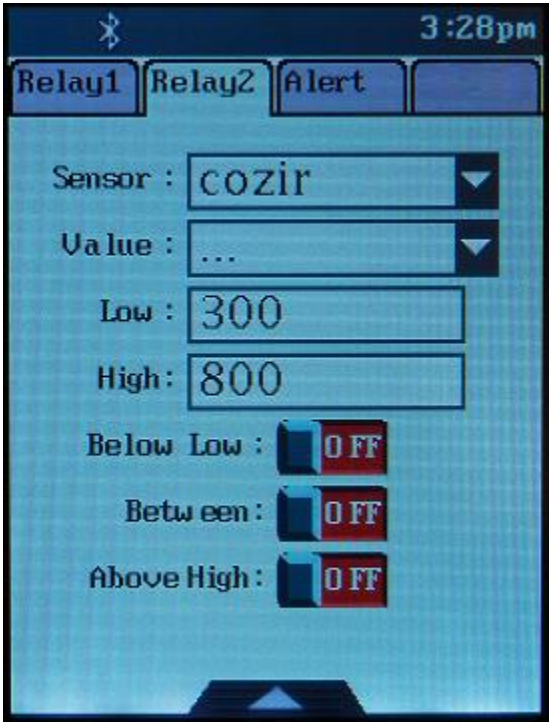
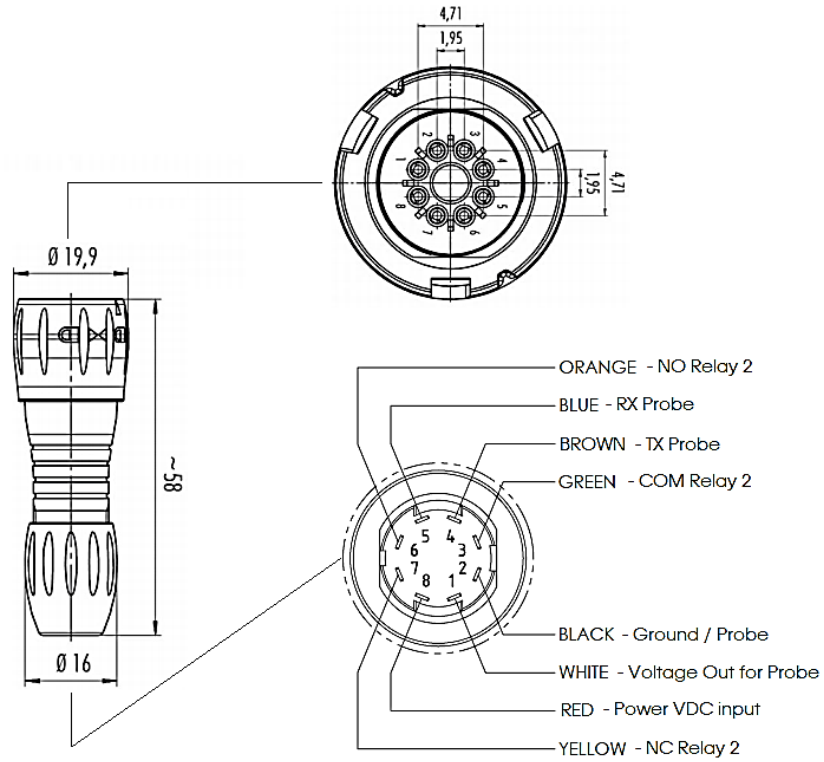


Figure 16: Output settings screen – RELAY2 tab.

RELAY 2 is available as an output located on pin #8 of the female connector. The meter includes a male connector that enables you to use the relay terminal (NC, NO, COM) to control any other device. The diagram below will help you locate the terminals for the relay.

RS-485
V


4,71
1,95
4,71
1,95
Ø 19,9
~58
Ø 16
ORANGE - NO Relay 2
BLUE - RX Probe
BROWN - TX Probe
GREEN - COM Relay 2
BLACK - Ground / Probe
WHITE - Voltage Out for Probe
RED - Power VDC input
YELLOW - NC Relay 2

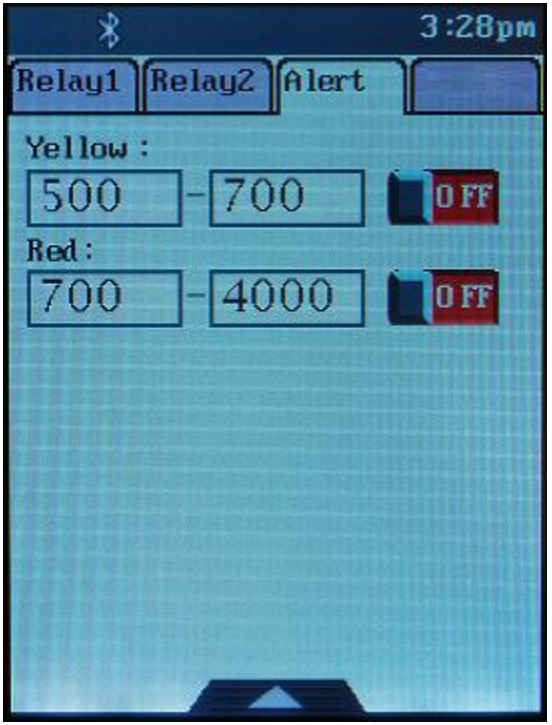


Figure 17: Output settings screen – ALERT tab.

The **ALERT** is an additional function of the meter which when programmed; the main screen will change colors according to the CO2 values that are pre-programmed, as shown below.

TIME/DATE Settings

Allows you to change the date and time on the meter for more accurate reference on the logs. The default time of your meter may vary depending on your location.

NOTE: Please review these settings before using the meter.

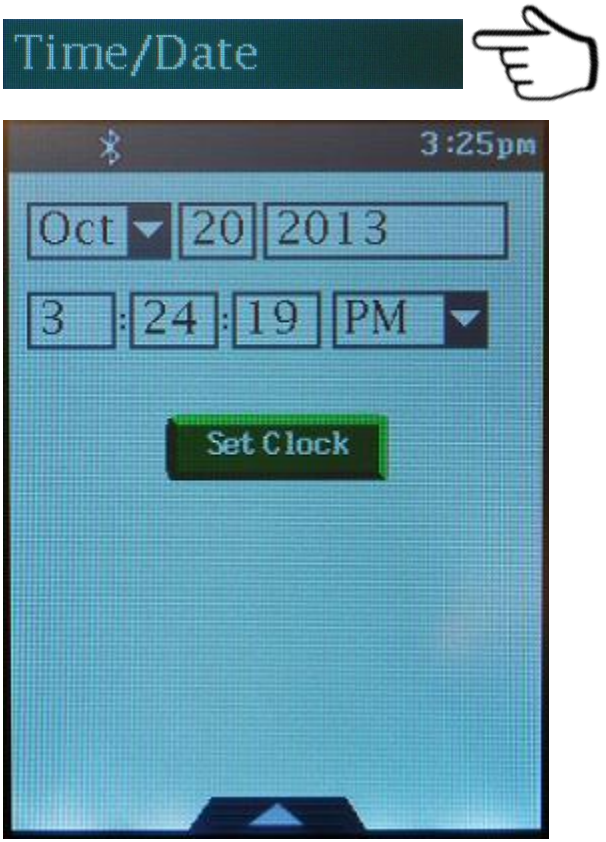


Figure 18: TIME/DATE settings screen.

LOGGING Settings

Allows you to configure the logging interval, specify the default file name, and turn the PRESSURE COMPENSATION feature ON/OFF, as shown on ***Figure 19*** below This will enable collection of data at a specified logging interval. ***Figure 20*** shows the PUMP tab screen, which allows you to set the PUMP TIMER if desired. If the pump timer is not configured, the pump will run continuously until user stops it using the controls on the main screen.

NOTE: Synchronize the logging interval of the meter so that it takes place while the pump is running (inside the pump interval).

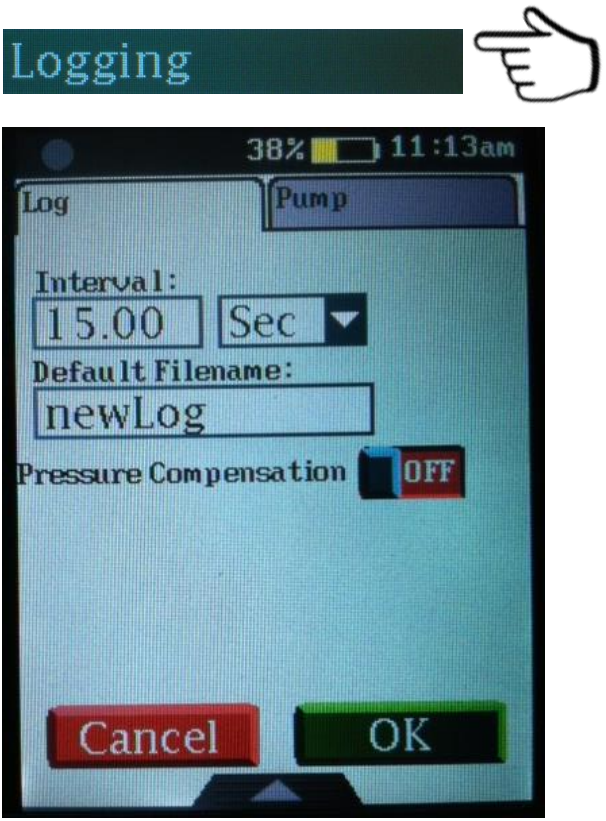


Figure 19: LOGGING settings screen – LOG tab.

Figure 20: LOGGING settings screen - PUMP tab.

Operation (Pump Only)

In order to use the meter, sampling hoses must be attached to the inlet and outlet fittings on the top of the meter as shown on ***Figure 1***. The pump will draw air from the inlet in a vacuum configuration, push it through the sensing chamber, and exhaust the air out through the outlet.

Closed Loop Operation

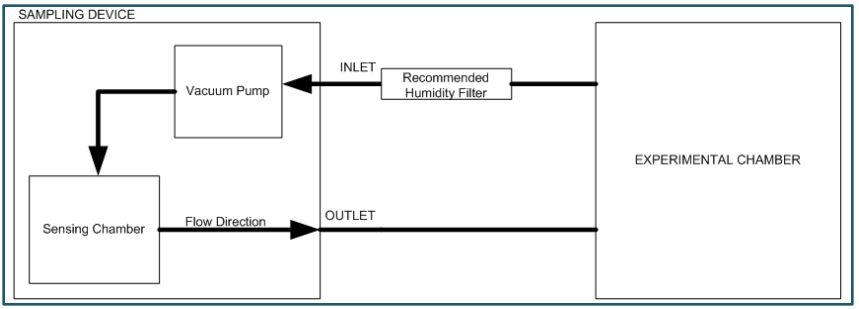


Figure 21: Closed loop operation setup.

Open Loop Operation with Environmental Exhaust

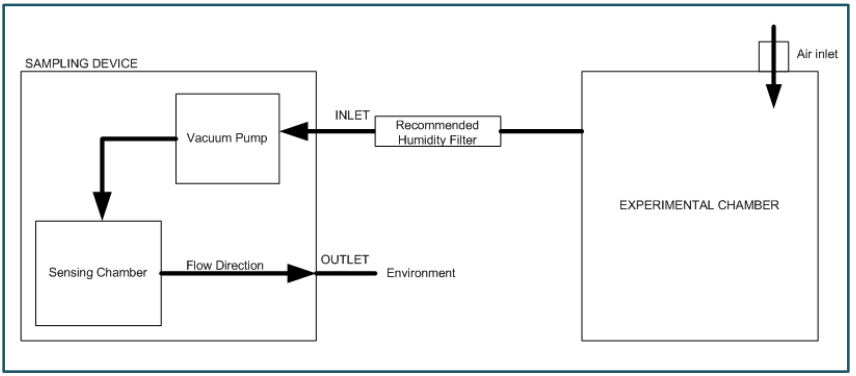


Figure 22: Open loop sampling setup.

Utilization of the included humidity/particulate filter is recommended for closed or open loop sampling to ensure sensing chamber and pump baffle remains clear and to prevent corrosion.

Troubleshooting Guide

Symptom / Issue	Possible Cause / Solution
Meter/Sensor is not recognized by the Handheld	The meter's batteries might be depleted. Replace the batteries with fresh ones, or if applicable, connect the device to the included power supply or call support.
Meter doesn't power ON	Confirm the power adapter is connected to the meter properly. Ensure proper power supply and the adapter connected has the appropriate voltage. If using batteries, confirm they are not depleted.
The meter is not logging	Confirm the SD card is installed correctly. Memory is full.
Slow response	Check the air flow channels to make sure they are not obstructed.
Reading doesn't change	Make sure the meter is in maximum or minimum mode.
Battery lightning bolt icon not shown when charging	The power adapter output voltage is inappropriate. Please use the included power supply.

Support

The quickest way to obtain technical support is via email. Please send all support inquires to **support@co2meter.com**.

Please include a clear, concise definition of the problem and any relevant troubleshooting information or steps taken so far, so we can duplicate the problem and quickly respond to your inquiry.

Warranty

This meter comes with a 1YEAR (warranty period) limited manufacturer's warranty, starting from the date the meter was shipped to the buyer.

During this period of time, CO2Meter.com warrants our products to be free from defects in materials and workmanship when used for their intended purpose and agrees to fix or replace (at our discretion) any part or product that fails under normal use. To take advantage of this warranty, the product must be returned to CO2Meter.com at your expense. If, after examination, we determine the product is defective, we will repair or replace it at no additional cost to you.

This warranty does not cover any products that have been subjected to misuse, neglect, accident, modifications or repairs by you or by a third party. No employee or reseller of CO2Meter.com's products may alter this warranty verbally or in writing.

Returns

If the product fails under normal use it may be returned. An RMA (Return Material Authorization) number is required to process any return no matter the reason.

To obtain an RMA number, please send an email to: support@co2meter.com

When requesting an RMA number, please provide the reason for return and original order number.

Once you have an authorization code you may complete your return processing by visiting www.co2metersupport.com/rma. When asked, enter the authorization code you were provided.

Please use the original packaging (if available) when returning the meter to CO2Meter. Include the provided RMA number on the outside of the box, preferably on the shipping label. Secure the meter inside the package properly to prevent any damage during transit. Ship your meter to the address listed on your RMA paperwork.

CO2Meter.com will not, under any circumstances, be responsible or issue refunds for any shipment expenses.

NOTE: For items returned during the warranty period, return shipping will not be charged.

Meters that are have failed due to improper use, damaged, abuse, or are out of warranty period will be examined and an estimate of repair/replacement will be provided to you.

Liability

All liabilities under this agreement shall be limited to the actual cost of the product paid to CO2Meter.com. In no event shall CO2Meter.com be liable for any incidental or consequential damages, lost profits, loss of time, lost sales or loss or damage to data, injury to person or personal property or any other indirect damages as the result of use of our products.

Contact Us

We are here to help!

For information or technical support, please contact us.

support@co2meter.com

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(386) 872-7665 (Sales)

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NOTES: